

OWEN Electric

A Touchstone Energy Cooperative 

March 28, 2008

RECEIVED

APR - 2 2008

PUBLIC SERVICE
COMMISSION

Mr. James A. Welch
Division Director of Engineering
Public Service Commission
P. O. Box 615
Frankfort, KY 40602

RE: 2007 Annual Reliability Report for Owen Electric Cooperative

Dear Mr. Welch:

Please find enclosed the 2007 Annual Reliability Report for Owen Electric Cooperative.

If you have any questions or need additional information, feel free to contact James D. See, Sr. VP of Systems Planning and Reliability at 502-563-3498 or jsee@owenelectric.com.

Sincerely,

OWEN ELECTRIC COOPERATIVE



James D. See, PE
Sr. VP of Systems Planning
and Reliability

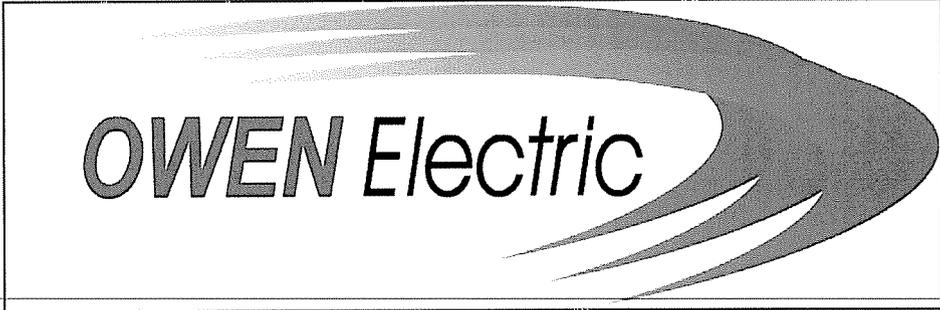
JDS:trb

Enclosure (1)

RECEIVED

APR 02 2008

PUBLIC SERVICE
COMMISSION

The logo for OWEN Electric features the company name in a bold, sans-serif font. The word "OWEN" is in all caps, and "Electric" is in title case. To the right of the text is a stylized, dark grey graphic element that resembles a swoosh or a lightning bolt, tapering to a point on the right side.

OWEN *Electric*

2007 Annual Reliability Report for PSC

Analysis

Prepared By: _____

James Petreshock
James Petreshock, Systems Technical Support Specialist

Approved By: _____

James D. See
James D. See P.E., Senior VP of System Planning & Reliability

Preface

Enclosed is Owen Electric Cooperative response the Kentucky PSC Administrative Case No. 2006-00494. All terms and calculations are based on IEEE Standard 1366 Guideline. The attached charts answer the questions on pages 8 and 9 of the above case requests. Following the charts is a summary of the findings, an analysis of the ten (10) worst circuits based on based on SAIDI, and some general comments by Owen Electric.

Contents

Page 1	Annual SAIFI, SAIDI, & CAIDI from 2002 thru 2007 for both the entire year and with Major Event Days (MED) removed.
Page 2	Historic System Reliability Index Trend Chart - Annual SAIFI, SAIDI, & CAIDI from 2002 thru 2007 for both the entire year and MED removed.
Page 3	A prioritized table of Contributing Outage Types for all and for MED removed for Owen Electric's Outages for 2007.
Page 4	A SAIFI prioritized table of Contributing Outage Causes for all and for MED removed for Owen Electric's Outages for 2007.
Page 5	A SAIDI prioritized table of Contributing Outage Causes for all and for MED removed for Owen Electric's Outages for 2007.
Page 6	A CAIDI prioritized table of Contributing Outage Causes for all and for MED removed for Owen Electric's Outages for 2007.
Page 7	A list of the ten (10) worst circuits by SAIFI Index both with and without MED.
Page 8	A list of the ten (10) worst circuits by SAIDI Index both with and without MED.
Page 9	A list of the ten (10) worst circuits by CAIDI Index both with and without MED.
Page 10	A chart of 2007 Daily SAIDI values with MED Threshold.
Page 11	A chart of 2002 to date of Daily SAIDI Values with MED Threshold.
Page 12	A Histogram of 2007 Ln(SAIDI/day) Distribution.
Page 13	A Five (5) Year Histogram up to 2007 Ln(SAIDI/day) Distribution
Page 14&15	Summary

OWEN Electric Cooperative System Reliability Indices

Year	SAIFI	SAIDI	CAIDI	# MEDs
2007	2.142	204.494	95.466	2
	1.653	130.134	78.723	
2006	1.787	146.757	82.145	0
	1.787	146.757	82.145	
2005	1.661	136.923	82.414	0
	1.661	136.923	82.414	
2004	1.881	270.349	143.697	3
	1.581	148.552	93.931	
2003	1.900	164.065	86.368	0
	1.900	164.065	86.368	
2002	2.014	164.818	81.825	2
	1.958	160.791	82.140	

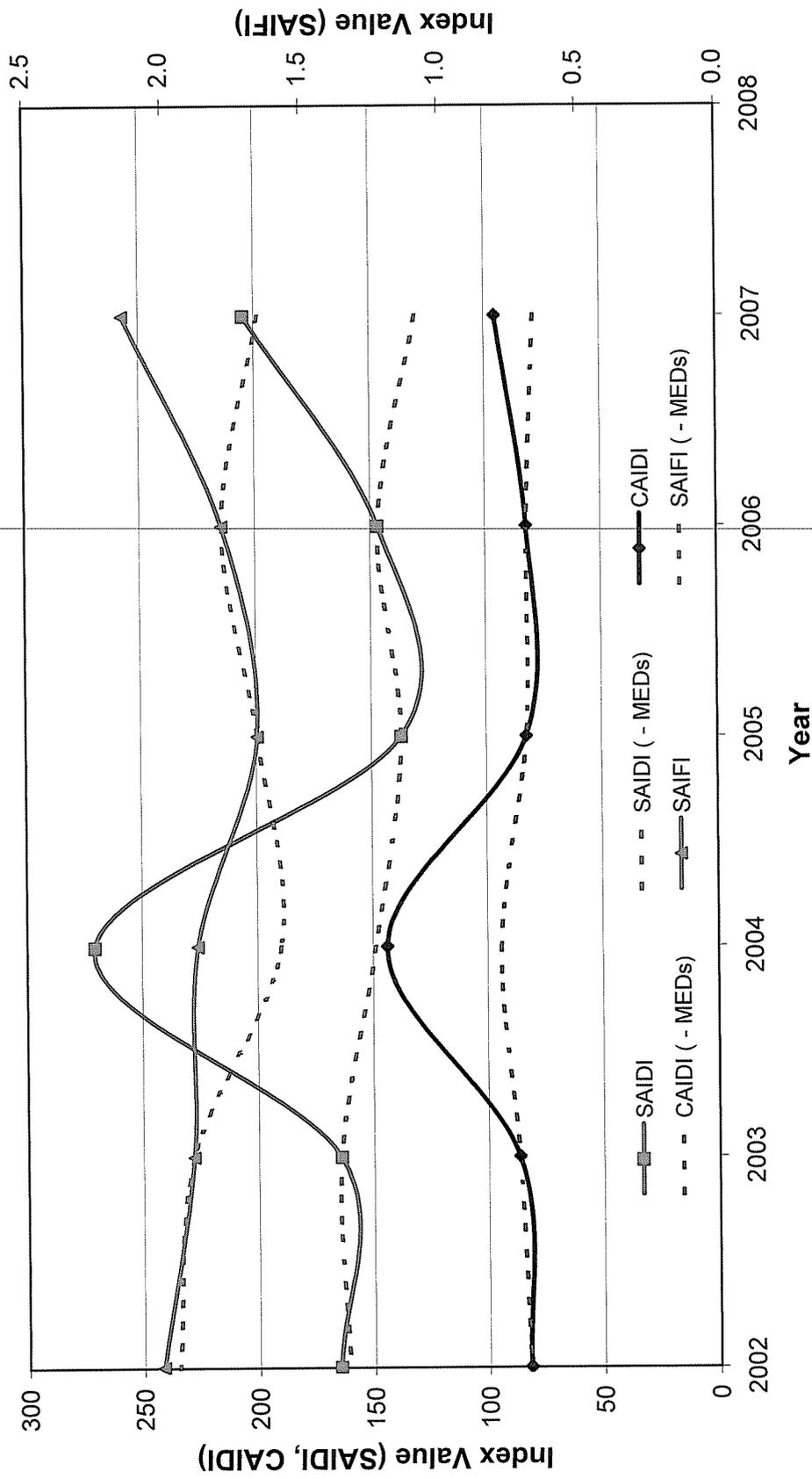
* Major Event Day (MED) are based upon the IEEE Std 1366-2003 on Electric Power Distribution Reliability Indices.

= Unfiltered

= MED Filtered

Notes: 2002 was a partial year (April 10th through December 31st) therefore we applied a corrective multiplier of 1.25 to the SAIDI and SAIFI indices for comparison to the following years.

Historical System Reliability Index Trends



**Contributing Outage Types for OEC Outages for 2007
Ordered by Occurances**

	#	Type	Occurances	CustomersOut	CustomerMinOut	% by Occurance	% by CustomersOut	% by CustomerMinOut
Unfiltered	1	Weather	469	14323	1385366	25.85%	8.69%	10.56%
	2	Birds/Animals	267	6522	345221	14.72%	3.96%	2.63%
	3	Unknown	199	6404	380291	10.97%	3.89%	2.90%
	4	Equipment/Installation	193	17642	1308483	10.64%	10.70%	9.97%
	5	Major Storm	175	17758	4096337	9.65%	10.77%	31.23%
	6	Scheduled	174	6219	440048	9.59%	3.77%	3.35%
	7	Power Supplier	93	74610	2812817	5.13%	45.27%	21.44%
	8	R.O.W. Preventable	87	6122	558656	4.80%	3.71%	4.26%
	9	Age/Deterioration	65	5776	1071496	3.58%	3.50%	8.17%
	10	Member/Public	47	5319	408250	2.59%	3.23%	3.11%
	11	R.O.W. Unpreventable	45	4121	311796	2.48%	2.50%	2.38%
MED Filtered	1	Weather	467	14293	1383316	28.34%	15.44%	18.98%
	2	Birds/Animals	266	6521	345164	16.14%	7.04%	4.74%
	3	Unknown	198	6400	379859	12.01%	6.91%	5.21%
	4	Equipment/Installation	192	17596	1305815	11.65%	19.00%	17.91%
	5	Scheduled	174	6219	440048	10.56%	6.72%	6.04%
	6	R.O.W. Preventable	87	6122	558656	5.28%	6.61%	7.66%
	7	Major Storm	77	4959	498270	4.67%	5.36%	6.84%
	8	Age/Deterioration	65	5776	1071496	3.94%	6.24%	14.70%
	9	Member/Public	47	5319	408250	2.85%	5.74%	5.60%
	10	R.O.W. Unpreventable	45	4121	311796	2.73%	4.45%	4.28%
	11	Power Supplier	30	15264	586290	1.82%	16.49%	8.04%

Outage Causes Contributing to OEC SAIFI Index for 2007
ordered by SAIFI

	#	Cause	Occurances	CustomersOut	CustomerMinOut	SAIFI	% by Occurance	% by CustomersOut	% by CustomerMinOut
Unfiltered	1	Lightning	368	29891	1300016	0.534	20.3%	18.1%	9.9%
	2	Material/Equipment Fault	114	24127	1161156	0.431	6.3%	14.6%	8.9%
	3	Trees-Other	228	21422	3888807	0.382	12.6%	13.0%	29.6%
	4	Faulty Material/Insulation	77	17677	1519785	0.316	4.2%	10.7%	11.6%
	5	Unknown	220	13410	896470	0.239	12.1%	8.1%	6.8%
	6	De-Energized for Repair	42	12357	305192	0.221	2.3%	7.5%	2.3%
	7	Small Animal/Bird	272	8944	389049	0.160	15.0%	5.4%	3.0%
	8	Major T-Storm	9	7015	484181	0.125	0.5%	4.3%	3.7%
	9	Trees and Ice	53	5261	480038	0.094	2.9%	3.2%	3.7%
	10	Public Accidents	32	4611	357493	0.082	1.8%	2.8%	2.7%
MED Filtered	1	Trees-Other	195	13660	1453367	0.244	11.8%	14.8%	19.9%
	2	Lightning	337	10080	791576	0.180	20.4%	10.9%	10.9%
	3	Faulty Material/Insulation	70	9868	1022880	0.176	4.2%	10.7%	14.0%
	4	De-Energized for Repair	41	9559	277212	0.171	2.5%	10.3%	3.8%
	5	Material/Equipment Fault	98	9091	738497	0.162	5.9%	9.8%	10.1%
	6	Small Animal/Bird	271	8943	388992	0.160	16.4%	9.7%	5.3%
	7	Unknown	208	7958	593118	0.142	12.6%	8.6%	8.1%
	8	Public Accidents	31	4610	357403	0.082	1.9%	5.0%	4.9%
	9	Trees and Ice	20	3432	232447	0.061	1.2%	3.7%	3.2%
	10	Conductor Sag/Clearance	7	2660	127495	0.047	0.4%	2.9%	1.7%

Outage Causes Contributing to OEC SAIDI Index for 2007
ordered by SAIDI

	#	Cause	Occurances	CustomersOut	CustomerMinOut	SAIDI	% by Occurance	% by CustomersOut	% by CustomerMinOut
Unfiltered	1	Trees-Other	228	21422	3888807	69.43	12.6%	13.0%	29.6%
	2	Faulty Material/Insulation	77	17677	1519785	27.13	4.2%	10.7%	11.6%
	3	Lightning	368	29891	1300016	23.21	20.3%	18.1%	9.9%
	4	Material/Equipment Fault	114	24127	1161156	20.73	6.3%	14.6%	8.9%
	5	Unknown	220	13410	896470	16.01	12.1%	8.1%	6.8%
	6	Ice/Sleet/Frost Not Trees	10	3644	531049	9.48	0.6%	2.2%	4.0%
	7	Major T-Storm	9	7015	484181	8.64	0.5%	4.3%	3.7%
	8	Trees and Ice	53	5261	480038	8.57	2.9%	3.2%	3.7%
	9	Electrical Overload	87	2854	430114	7.68	4.8%	1.7%	3.3%
	10	High Wind	28	1906	408636	7.30	1.5%	1.2%	3.1%
MED Filtered	1	Trees-Other	195	13660	1453367	25.95	11.8%	14.8%	19.9%
	2	Faulty Material/Insulation	70	9868	1022880	18.26	4.2%	10.7%	14.0%
	3	Lightning	337	10080	791576	14.13	20.4%	10.9%	10.9%
	4	Material/Equipment Fault	98	9091	738497	13.18	5.9%	9.8%	10.1%
	5	Unknown	208	7958	593118	10.59	12.6%	8.6%	8.1%
	6	Electrical Overload	82	2479	403214	7.20	5.0%	2.7%	5.5%
	7	Small Animal/Bird	271	8943	388992	6.94	16.4%	9.7%	5.3%
	8	Public Accidents	31	4610	357403	6.38	1.9%	5.0%	4.9%
	9	Contractor Installation	80	2289	284314	5.08	4.9%	2.5%	3.9%
	10	De-Energized for Repair	41	9559	277212	4.95	2.5%	10.3%	3.8%

Outage Causes Contributing to OEC CAIDI Index for 2007
ordered by CAIDI

	#	Cause	Occurances	CustomersOut	CustomerMinOut	CAIDI	% by Occurance	% by CustomersOut	% by CustomerMinOut
Unfiltered	1	Flood	1	5	2080	416.00	0.1%	0.0%	0.0%
	2	High Wind	28	1906	408636	214.39	1.5%	1.2%	3.1%
	3	Trees-Other	228	21422	3888807	181.53	12.6%	13.0%	29.6%
	4	Age	5	5	774	154.80	0.3%	0.0%	0.0%
	5	Tree Cut On Line	9	329	50169	152.49	0.5%	0.2%	0.4%
	6	Electrical Overload	87	2854	430114	150.71	4.8%	1.7%	3.3%
	7	Aged Conductor Failure	19	1572	233815	148.74	1.0%	1.0%	1.8%
	8	Bad Transformer Jumper	1	7	1022	146.00	0.1%	0.0%	0.0%
	9	Ice/Sleet/Frost Not Trees	10	3644	531049	145.73	0.6%	2.2%	4.0%
	10	Installation Fault	1	1	139	139.00	0.1%	0.0%	0.0%
MED Filtered	1	Electrical Overload	82	2479	403214	162.65	5.0%	2.7%	5.5%
	2	Age	5	5	774	154.80	0.3%	0.0%	0.0%
	3	Aged Conductor Failure	19	1572	233815	148.74	1.2%	1.7%	3.2%
	4	Bad Transformer Jumper	1	7	1022	146.00	0.1%	0.0%	0.0%
	5	Tree Cut On Line	7	282	40331	143.02	0.4%	0.3%	0.6%
	6	Major T-Storm	1	2	284	142.00	0.1%	0.0%	0.0%
	7	Installation Fault	1	1	139	139.00	0.1%	0.0%	0.0%
	8	Line Vibration	24	131	17080	130.38	1.5%	0.1%	0.2%
	9	Contractor Installation	80	2289	284314	124.21	4.9%	2.5%	3.9%
	10	Extreme Cold	15	203	24408	120.24	0.9%	0.2%	0.3%

10 Worst Circuits by SAIFI Index

	Rank	Substation	Feeder	SAIFI Index	SAIDI Index	CAIDI Index	Major Contributing Outage Category
Unfiltered	1	WILLIAMSTOWN	0502	5.91	255.93	43.31	Weather
	2	DURO	1706	5.49	501.13	91.29	Major Storm
	3	BULLITTSVILLE	0801	4.91	328.04	66.78	Major Storm
	4	MUNK	0402	4.77	478.04	100.23	Major Storm
	5	GRIFFIN	0904	4.49	778.15	173.12	Major Storm
	6	BOONE	0103	4.44	302.56	68.08	Weather
	7	BAVARIAN	2302	4.42	190.40	43.07	Birds/Animals
	8	BRISTOW	1402	4.08	74.49	18.26	Power Supplier
	9	MUNK	0403	3.89	384.49	98.83	Weather
	10	MUNK	0404	3.86	207.06	53.63	Weather
MED Filtered	1	WILLIAMSTOWN	0502	4.81	180.96	37.61	Weather
	2	BULLITTSVILLE	0801	4.43	268.62	60.66	Birds/Animals
	3	BAVARIAN	2302	4.42	190.17	43.04	Birds/Animals
	4	BOONE	0103	4.41	298.50	67.70	Weather
	5	BRISTOW	1402	4.08	74.49	18.26	Power Supplier
	6	DURO	1706	3.95	159.34	40.33	Birds/Animals
	7	DURO II	5402	3.75	709.93	189.54	Weather
	8	TURKEYFOOT	1004	3.71	176.97	47.73	Birds/Animals
	9	GRIFFIN	0904	3.50	246.88	70.50	Weather
	10	KEITH	1301	3.37	89.54	26.57	Unknown

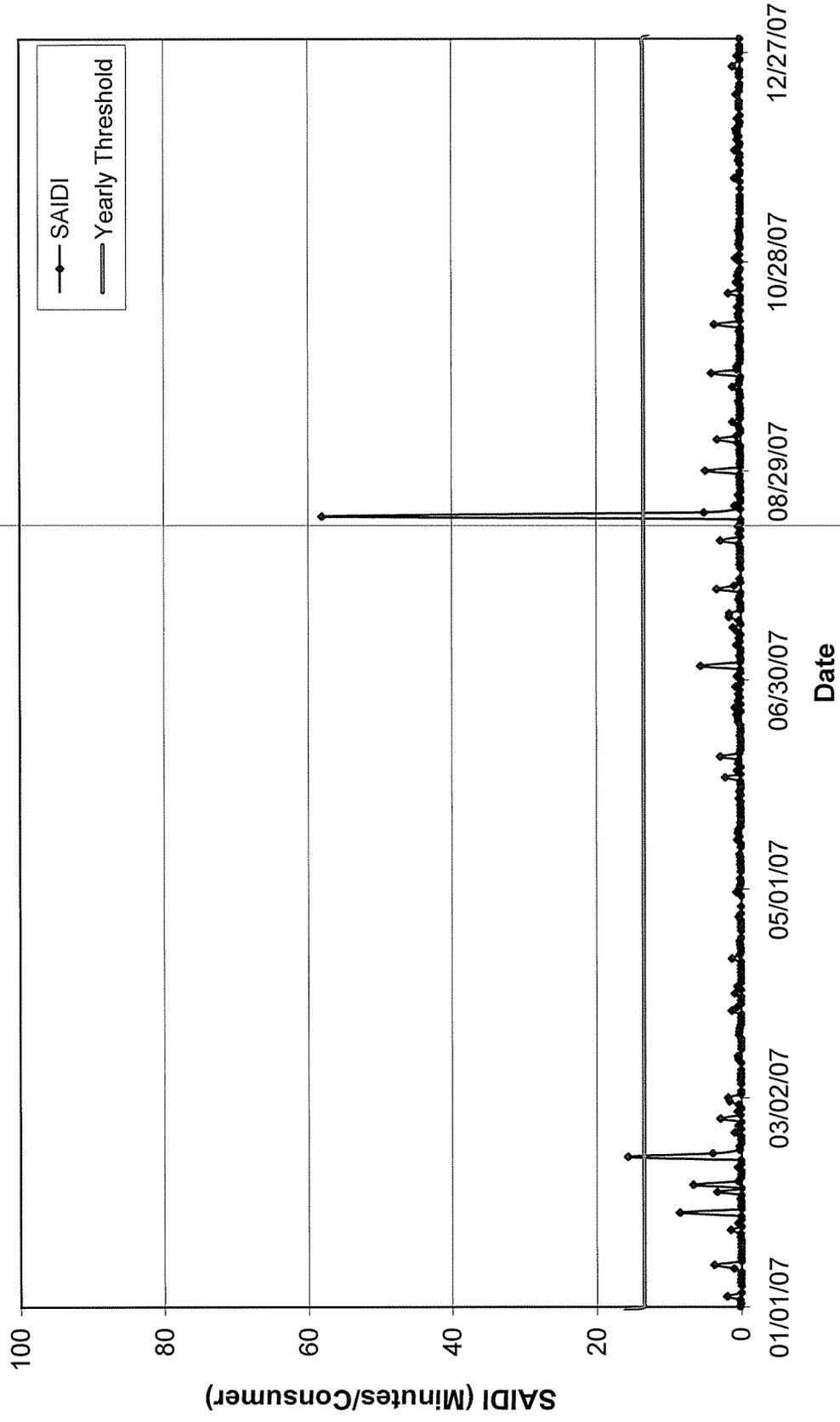
10 Worst Circuits by SAIDI Index

	Rank	Substation	Feeder	SAIDI Index	SAIFI Index	CAIDI Index	Major Contributing Outage Category
Unfiltered	1	GRIFFIN	0901	859.82	3.16	272.12	Major Storm
	2	GRIFFIN	0904	778.15	4.49	173.12	Major Storm
	3	WILLIAMSTOWN	0505	713.17	3.64	195.73	Major Storm
	4	DURO II	5402	709.93	3.75	189.54	Age/Deterioration
	5	SMITH	1505	688.84	3.35	205.57	Equipment/Installation
	6	GRIFFIN	0902	564.43	2.91	193.78	Major Storm
	7	MUNK	0401	536.49	2.61	205.87	Major Storm
	8	DURO	1706	501.13	5.49	91.29	Major Storm
	9	BIG BONE	1201	482.50	3.84	125.80	Weather
	10	MUNK	0402	478.04	4.77	100.23	Major Storm
MED Filtered	1	DURO II	5402	709.93	3.75	189.54	Age/Deterioration
	2	SMITH	1505	522.35	2.33	223.86	Equipment/Installation
	3	GRANTS LICK II	5101	416.06	1.82	228.72	Age/Deterioration
	4	BIG BONE	1201	411.38	2.83	145.18	Weather
	5	GRANTS LICK II	5106	393.36	3.34	117.94	Age/Deterioration
	6	BOONE	0103	298.50	4.41	67.70	Equipment/Installation
	7	BULLITTSVILLE	0801	268.62	4.43	60.66	Birds/Animals
	8	SMITH II	5202	266.63	2.99	89.24	Power Supplier
	9	MUNK	0402	261.62	2.60	100.51	R.O.W. Preventable
	10	MUNK	0403	252.96	2.85	88.61	Weather

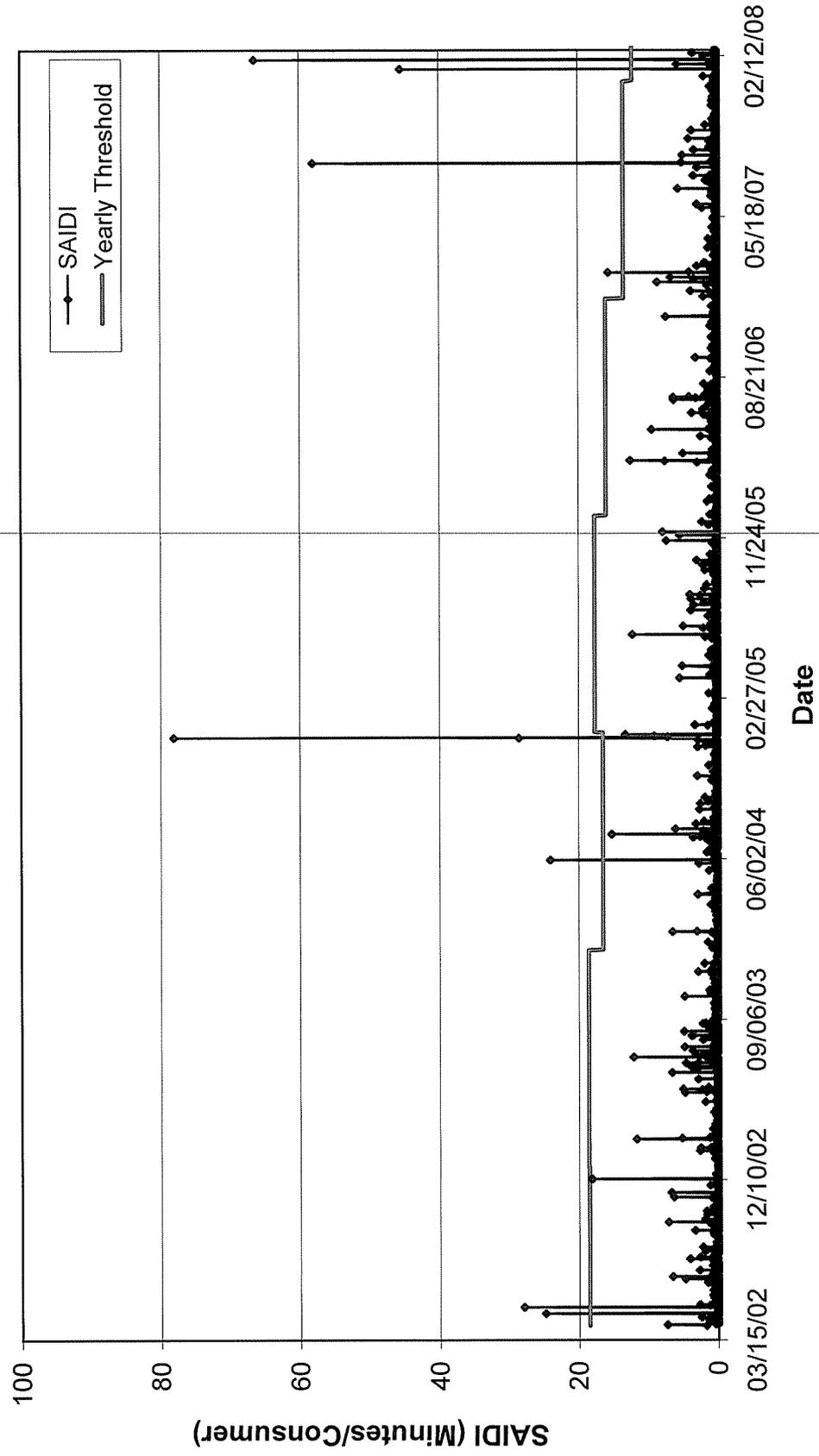
10 Worst Circuits by CAIDI Index

	Rank	Substation	Feeder	CAIDI Index	SAIFI Index	SAIDI Index	Major Contributing Outage Category
Unfiltered	1	BANKLICK	0201	391.19	0.53	207.65	Scheduled
	2	GRIFFIN	0901	272.12	3.16	859.82	Major Storm
	3	GRANTSLICK II	5101	228.65	1.82	416.09	Age/Deterioration
	4	MUNK	0401	205.87	2.61	536.49	Major Storm
	5	SMITH	1505	205.57	3.35	688.84	Equipment/Installation
	6	WILLIAMSTOWN	0505	195.73	3.64	713.17	Major Storm
	7	RICHARDSON	1903	195.00	0.01	1.02	Age/Deterioration
	8	GRIFFIN	0902	193.78	2.91	564.43	Major Storm
	9	DURO II	5402	189.54	3.75	709.93	Age/Deterioration
	10	GRIFFIN	0904	173.12	4.49	778.15	Major Storm
MED Filtered	1	BANKLICK	0201	391.19	0.53	207.65	Scheduled
	2	GRANTSLICK II	5101	228.72	1.82	416.06	Age/Deterioration
	3	SMITH	1505	223.86	2.33	522.35	Equipment/Installation
	4	RICHARDSON	1903	195.00	0.01	1.02	Age/Deterioration
	5	DURO II	5402	189.54	3.75	709.93	Age/Deterioration
	6	MUNK	0401	179.79	0.59	105.64	Major Storm
	7	WILLIAMSTOWN	0505	145.35	1.66	240.99	Major Storm
	8	BIG BONE	1201	145.18	2.83	411.38	Weather
	9	BULLITTSVILLE	0802	140.95	0.39	55.03	R.O.W. Preventable
	10	SMOOT	1602	139.81	1.41	197.09	Age/Deterioration

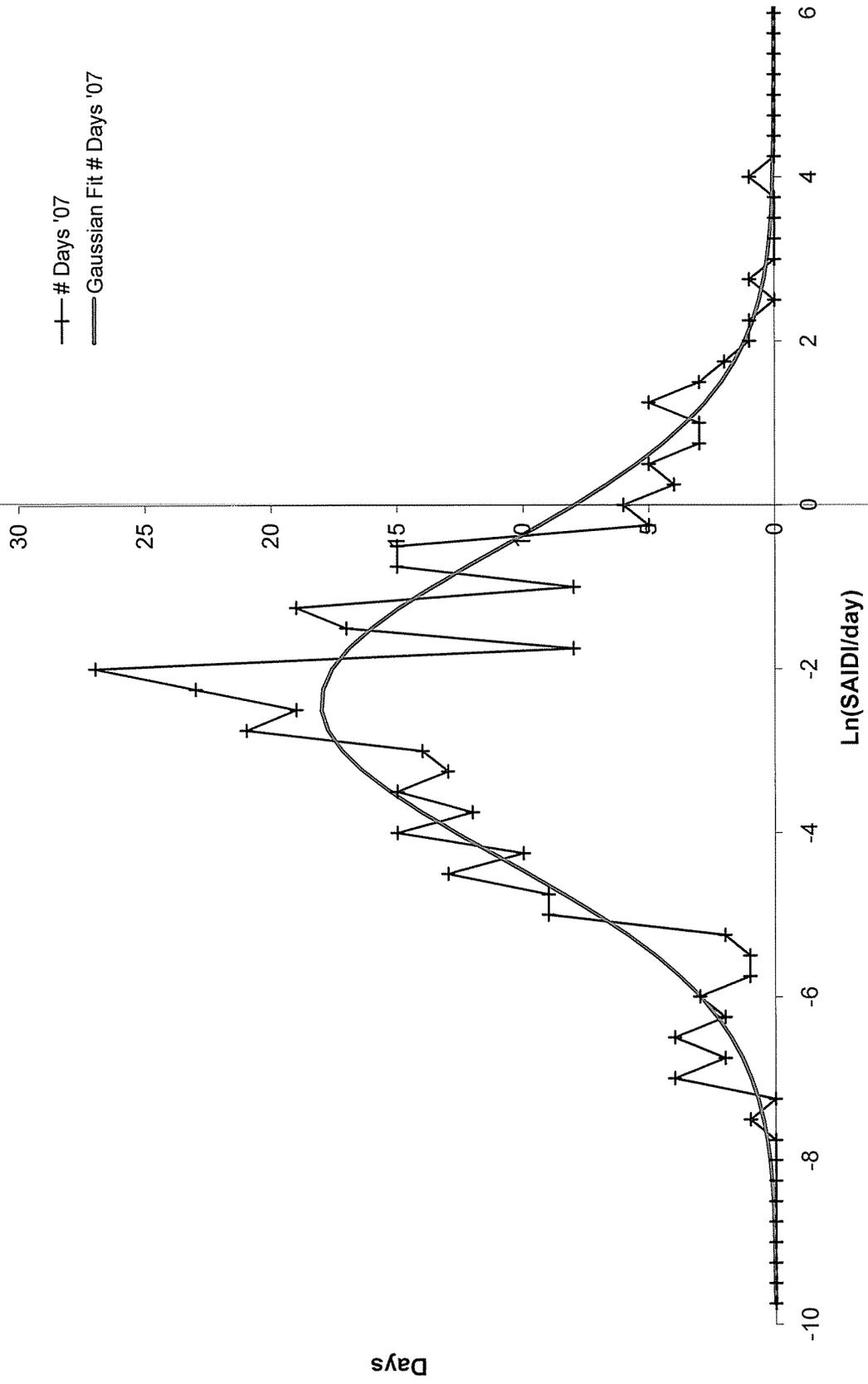
2007 Daily SAIDI values with MED Threshold



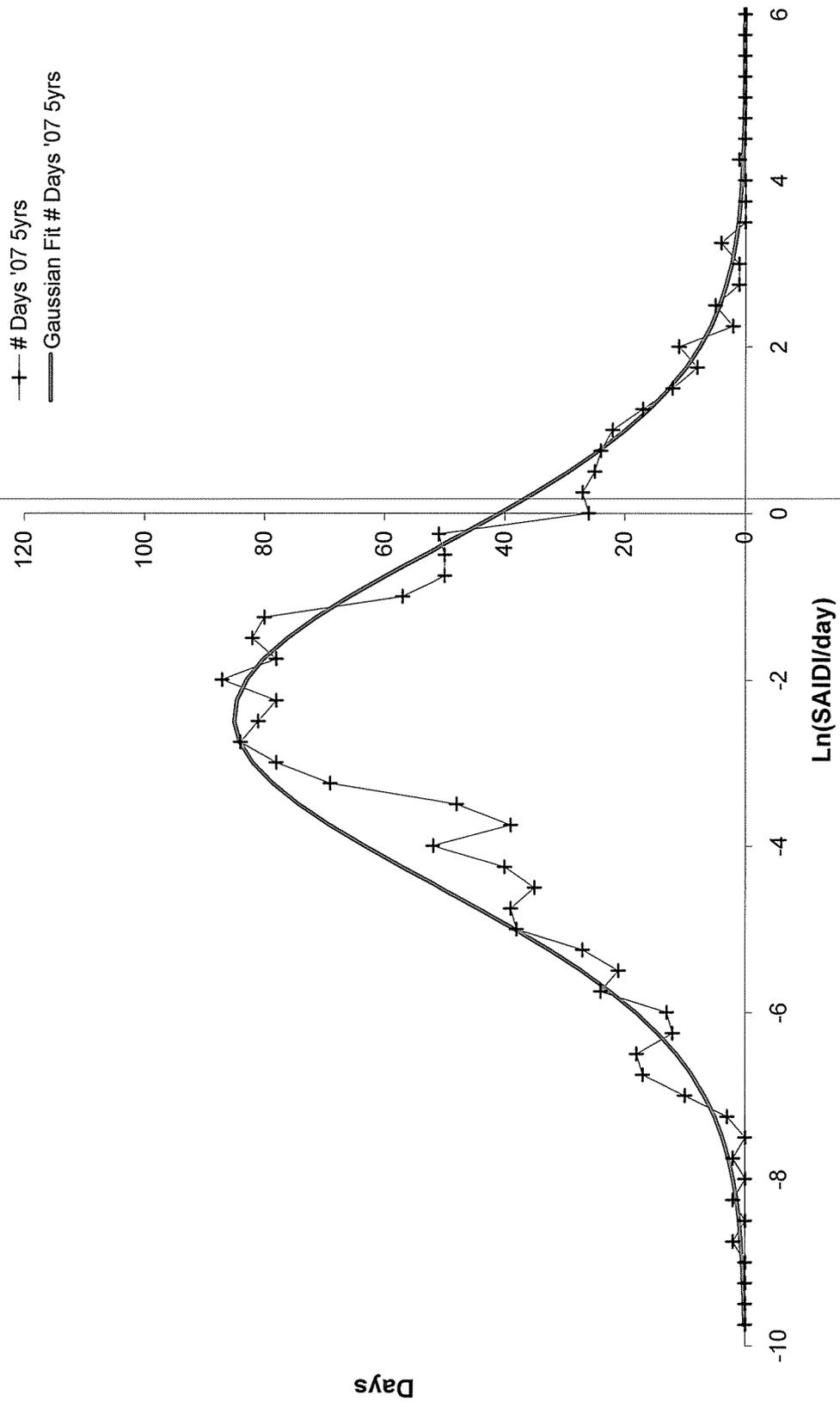
Daily SAIDI Values with MED Threshold



Histogram of 2007 Ln(SAIDI/day) Distribution



Histogram of Ln(SAIDI/day) Distribution for 5 Years Prior to 2007



Summary

What does all this mean? The first table (page 1) and chart (page 2) shows our reliability indices as recorded by our Outage Management System (OMS) developed by Milsoft Utility Solutions of Abilene, Texas. Using IEEE Standard 1366 we were able to filter outages for days determined to be Major Event Days (MED). This analysis method is well suited for filtering out anomalous days to better establish system performance. Particularly because most the MED outages are caused by situations outside of the RUS construction guidelines that we are required to follow.

On page 2 we detail information regarding the primary outage types experienced on our system and their contribution by occurrence, customers affected, and customer outage duration. Pages 4 through 6 reviews the top 10 cause contributors to Owen Electric's system reliability indices (SAIFI, SAIDI, and CAIDI) such as; weather, birds/animals, lightning, etc. Note, weather, major storms, and power supplier are to a large extent outside of Owen Electric's control to correct so they are not focused on. The other contributors are being addressed by company standards or programs, all new transformers contain animal guards. When we find an animal problem area, we scheduled crews to install animal guards on all the transformers in this area. We are addressing lightning problems through a program to installing more lightning arrestors in problem areas. For equipment problems we have set up a maintenance program for all distribution reclosers. We are also addressing load issues on our small conductor by replacing this wire with high capacity conductor. We are also changing out certain insulators due to a known high failure rate.

On pages 7 through 10 details the top 10 worst performing circuits based upon each reliability index for Owen Electric's system. This reveals that the majority of circuit outages were caused by either major storm or weather, which as we noted above, is outside of OEC's control, so very little can be done to reduce the outages on those circuits.

The last section, pages 10 through 13, details our analysis of the daily SAIDI values to determine the MED threshold for 2007 for our system using the IEEE Standard 1366. Included are; a chart of daily SAIDI values for 2007 (page 10), a chart of the Daily SAIDI values since April 2002 (page 11), Histogram of LN(SAIDI/day) for 2007 (page 12), and a histogram of LN(SAIDI/day) for 5 yrs of data prior to 2007 (page 13).

The final area to be addressed is the ten (10) worst performing circuits that Owen Electric used for this report were the ten (10) worst SAIDA circuits that are noted in this report. Seven (7) of those circuits, the major contributor was major storm, which as noted above to a very large extent outside of Owen Electric's control. The other three (3) we will address here. The first Duro II, Circuit 5402 is number four (4) of the worst performing circuits and it had one extended outage that was over 80% of the SAIDI number. That outage was actually an overload that the engineering load flow analysis did not capture due to a large amount of electric heat that was on during a very cold evening. It overloaded a single phase line that overloaded a line recloser which then caused a circuit problem and took almost ten (10) hours to restore. This problem was corrected by three phasing the area with new larger wire, upgrading the line reclosers, as well as adding a second phase into this development. The next was Smith, Circuit 1505, which also had one long (almost 12 hours) outage due to a bad set of underground splices in a vault. As a result

new wire was installed to reduce the chance of a future failure. This contributed to 60% of the SAIDI value for this circuit and 31% was major storm. The last was Circuit 1201 out of Big Bone substation. It also had one major outage that caused the majority of the circuit high SAIDI value (41% of it). This outage was due to severe weather, which typically is outside of our control. In this situation, a large tree from outside our established ROW fell across our lines. The stress placed on a crossarm exceeded the design tolerances and as a result the cross arm broke. This outage lasted seven (7) hours due to the extent of the damage.
